



U.S. Department of Energy
**Energy Efficiency
and Renewable Energy**

Bringing you a prosperous future where energy
is clean, abundant, reliable, and affordable



Solar Energy Technologies Program

DOE Program Rep section:

- 1.) Whole Program Overview
- 2.) Subprogram Overview

Systems Integration Subprogram (Evaluation, Validation, & Analysis Track)



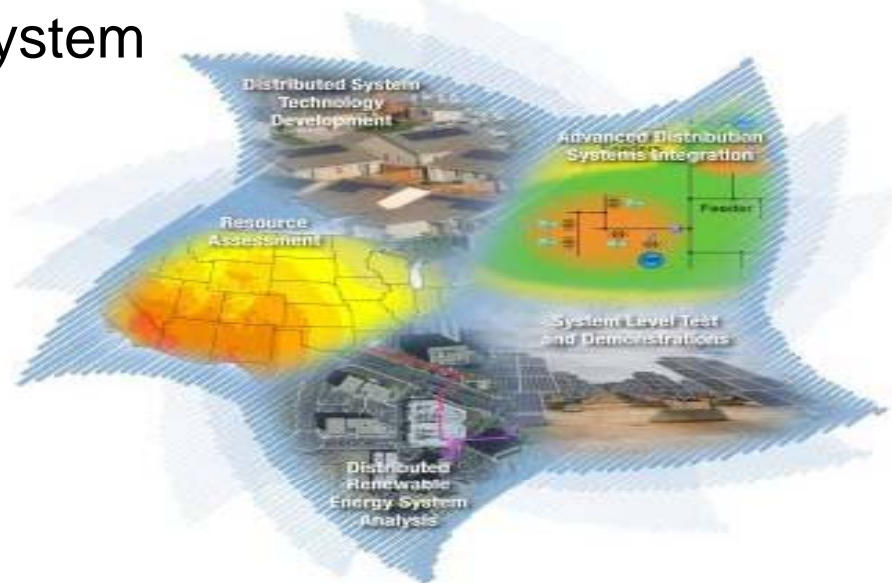
Systems Integration Subprogram Overview

Subprogram Element

- Grid Integration
- Reliability R&D
- System Engineering
- Modeling & Analysis
- Resource & Safety

Grid Integration

Objective: Address integration challenges associated with high-penetration levels of solar energy electricity on the electric power system

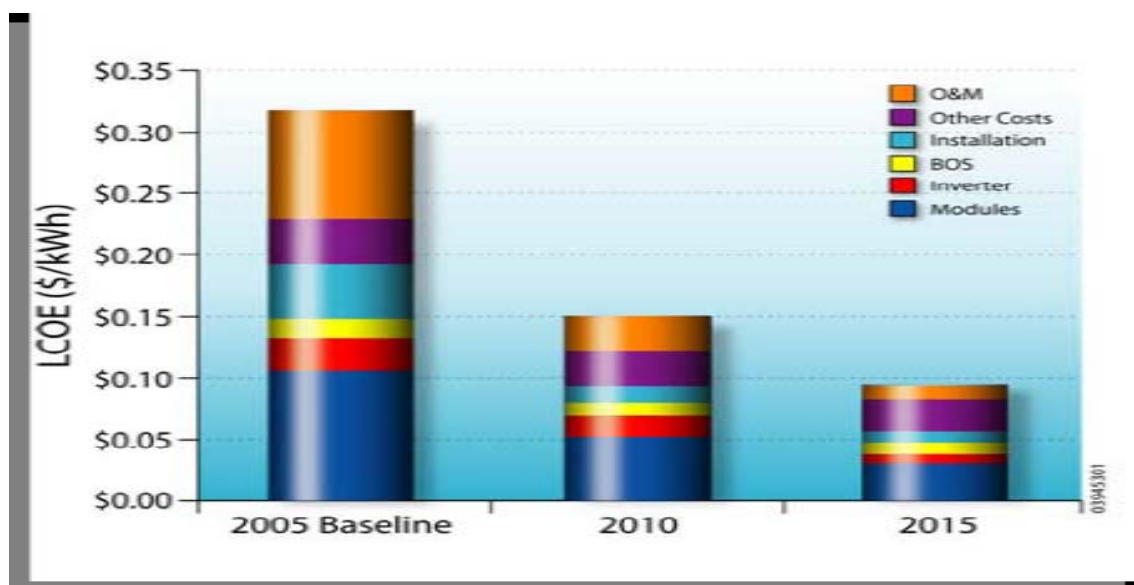


Multi-year Research Plan guided by the 14 Renewable Systems Interconnection (RSI) reports and structured into six areas

Project	FY09 Funding
PV Grid Integration Industry Support at NREL	\$200K
PV Grid Integration Industry Support at SNL	\$200K
SEGIS Projects (\$450 at SNL; \$2,835 to industry)	\$3,285K
High-Penetration PV Demo & Analysis (Solicitation)	\$5,000K

Reliability R&D

Objective: Develop and apply a process (data, methodology, and model) to predict, detect, and mitigate reliability issues in PV components and systems

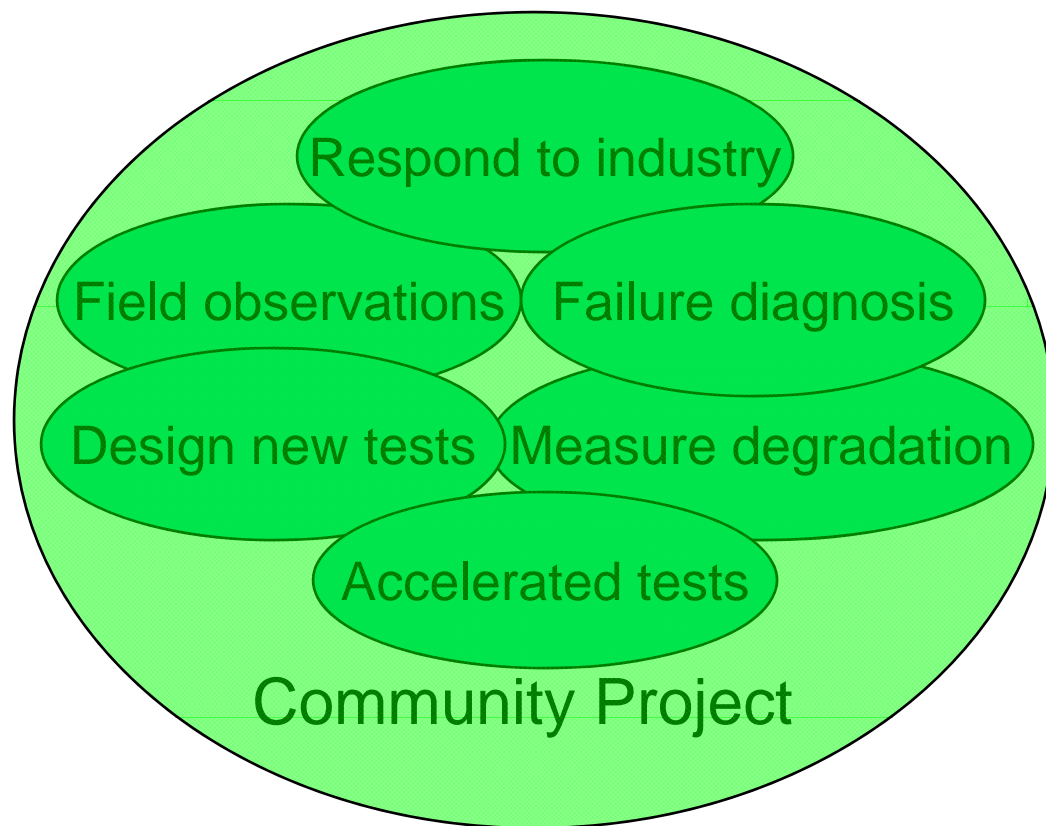


Long-term Reliable Performance of Modules & Systems Critical to Cost Parity -
More than 20 years required for most components and systems

Project	FY09 Funding
Reliability R&D at NREL	\$2,600K
Reliability R&D at SNL	\$1,555K
PV Community Project (Scope/performing entity TBD)	\$1,000K

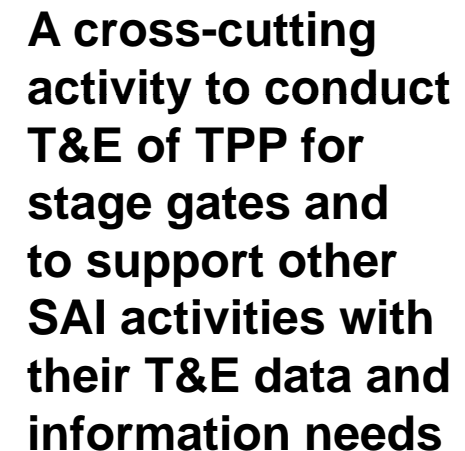
PV Community Project

Coordinated effort on data collection, validation, and analysis of commercial PV systems and components for reliability improvements; establishment of a web-based database for PV performance data and analysis information to be sharable with the entire community



- RFI issued on November 19
- 15 responses received by December 17
- Special meeting held February 25-26 to further refine scope and priority of activities, based on industry input to RFI responses and lab assessments
- Procurement planning underway

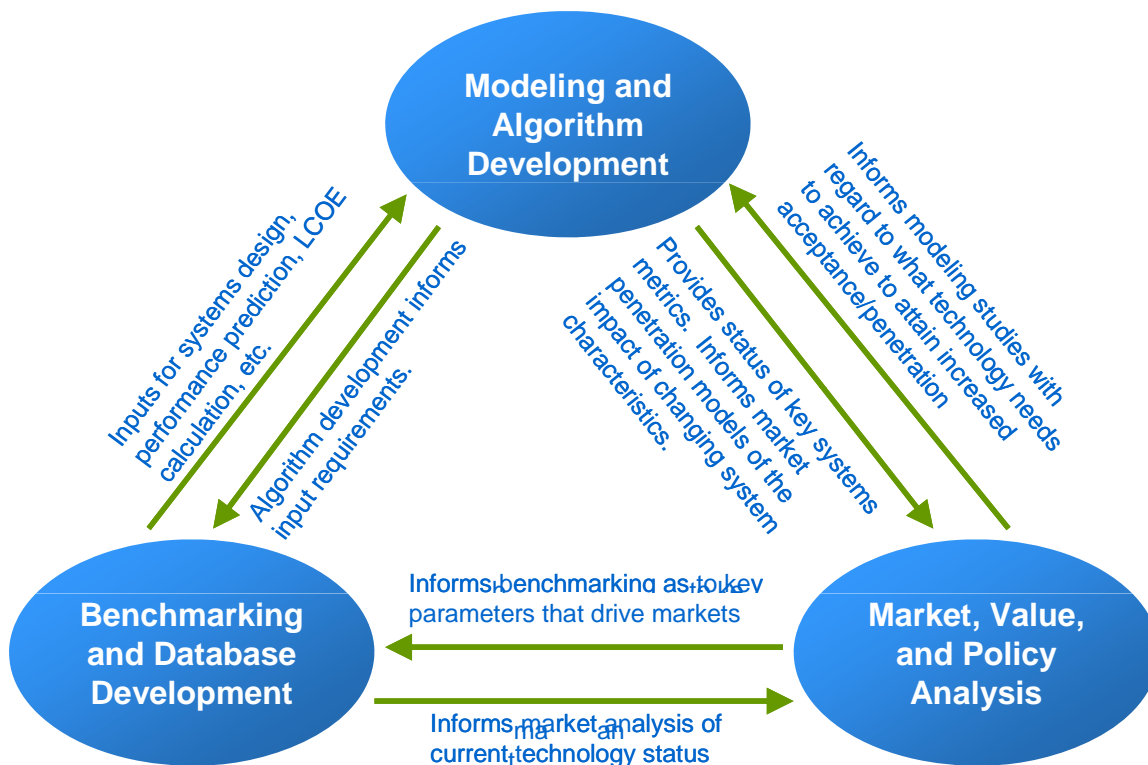
Objective: Define and develop measurement techniques, and conduct test & evaluation (T&E) to understand performance of materials, processes, and technologies for system improvements and value assessments



Project	FY09 Funding
Modules, Array, and Systems T&E at NREL	\$1,775K
Modules, Array, and Systems T&E at SNL	\$1,070K
Regional Experiment Stations (NM State U. & Florida Solar Energy Center)	\$1,750K

Modeling & Analysis

Objective: Develop and employ a suite of analysis, modeling, and benchmarking tools with supporting data for planning, technology evaluation, and decision making by the solar community

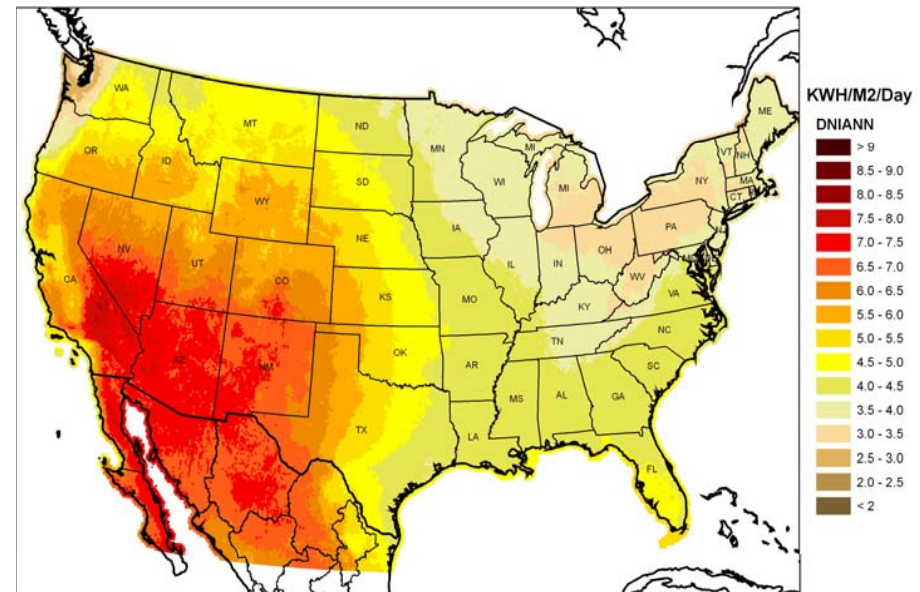


Project	FY09 Funding
System Modeling at NREL	\$1,025K
System Modeling at SNL	\$ 615K
System Analysis at NREL	\$2,005K

Resource & Safety



Objective: Develop solar resource forecasts; provide reliable, site-time specific solar resource and weather data; and preserve the safe and environmentally friendly nature of PV and minimize EH&S risks



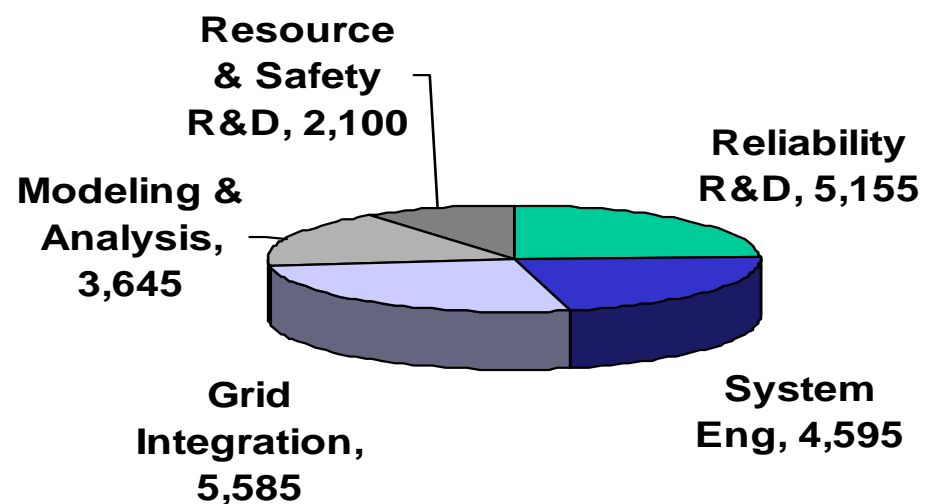
Project	FY09 Funding
Solar Radiometry and Modeling at NREL	\$880K
Resource Assess & Character (NREL:\$520K; Subcons: \$230K)	
ES&H/Lifecycle Research at BNL	\$470K
	\$750K

Resources: Funding by Subprogram Element, and by Lab/Private Sector

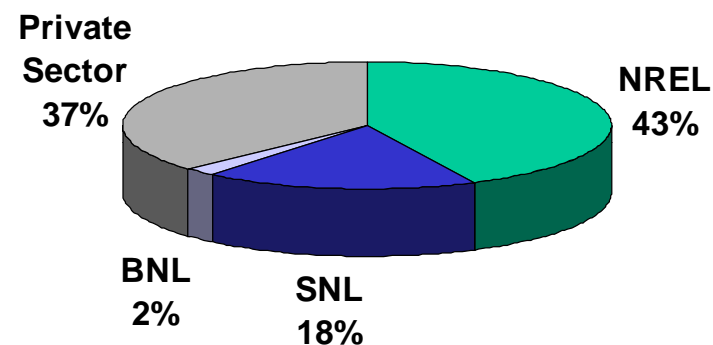


FY09 Subprogram Total Funding: \$21,080K

Funding by element



Funding by lab/private sector





SWOT Rollup

Strengths

- Strong R&D, & analysis capabilities within labs
- Seen as an objective 3rd party by the industry
- Completion of RSI study & multi-year program plan
- Established stage-gate review & AOP processes

Weaknesses

- No vision goal (like 20% wind)
- Process to share performance data and analysis results with a broad PV community still not established
- Plan and role of labs in System Engineering and Reliability not well defined

Opportunities

- Significant boost of solar R&D from the stimulus package
- Grid integration gaining recognition as an increasingly important area
- New opportunities to partner with industry on PV community project and grid integration
- Growing support for solar energy

Threats

- Lagging grid infrastructure to accommodate high penetration of PV
- DR island systems too slow being accepted by industry
- Lack of industry-accepted test & analysis methodology, codes, and standards



Management Challenges and Opportunities

Challenges

- Define clear role of labs vs. industry vs. universities in testing, data collection, data analysis, and database development, leading to a strong partnership effort involving the entire community
- Build strong and broad stakeholder constituencies in establishing and supporting achievement of high-penetration targets
- Better coordinate grid integration and energy storage development activities with OE and other EERE programs
- Better coordinate activities in codes & standards development across the EERE/OE

Opportunities

- Leveraging DOE funding viewed as increasingly important by industry in today's tight credit environment---industry to be more receptive to building public/private partnerships
- RPS targets, ITC, and opportunities in the stimulus package presenting electric utilities with strong incentives to consider solar electricity in their generation mixes
- Grid integration and energy storage gaining recognition in EERE/OE in need for integrated approaches
- Smart grid infrastructure build-up presenting many integration opportunities for solar electricity